

THE EFFECT OF THE ASIAN FINANCIAL CRISIS ON MARKET LIQUIDITY AND STOCK RETURNS: EVIDENCE FROM AN EMERGING MARKET

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Abstract

This study investigates the impact of market liquidity on stock returns in Malaysia during the 1997 Asian Financial Crisis. We employ two metrics of market liquidity: the turnover ratio and the turnover-volatility ratio. Upon adjusting for beta, size, book-to-market ratio, and momentum, we find that both market liquidity indicators positively and significantly elucidate stock returns in Malaysia during that period. Utilizing the bid-ask spread as our liquidity measure, rather than the turnover ratio or the turnover-volatility ratio, yields similar results i.e., market liquidity has a positive and significant impact on stock returns in Malaysia. The Asian Financial Crisis also did not significantly alter the effect of liquidity on stock returns in Malaysia. In other words, market liquidity exerted a positive and significant impact on returns both before and after the crisis. These findings affirm that market liquidity plays an important role for stock returns. Even a significant financial catastrophe, such as the Asian crisis, did not affect the positive relationship between market liquidity and returns.

Keywords: *liquidity, turnover ratio, turnover-volatility ratio, stock returns, Asian financial crisis*

1. Introduction

Previous papers including Fouse (1977), Amihud and Mendelson (1986), Brennan et al. (1998), Chordia et al. (2001), Datar et al. (1998), and Jun et al. (2003) show that there is a significant relationship between market liquidity and asset prices. At the same time, several other papers like Amihud et al. (1990) and Wong and Fung (2001) show that financial crises tend to have a negative impact on market liquidity.

In this study, we merge these two streams of research and argue that financial crises are crucial to stock markets due to their huge impact on stock market liquidity. We focus on the 1997 Asian Financial Crisis and examine how it affected the relationship between market liquidity and stock returns. We use two measures of liquidity: the turnover ratio and the turnover-volatility ratio. While the turnover ratio, which was used by Datar et al. (1998), Bekaert et al. (2007), Chan and Faff (2003), Chordia et al. (2001), Jun et al. (2003), and Rouwenhorst (1999), measures the depth of liquidity, the turnover-volatility ratio (as employed by Jun et al., 2003) is essentially a volatility-adjusted measure of the turnover ratio.

First, we examine whether these two market liquidity variables explain stock returns in Malaysia. Then, we examine the interacting effect of the Asian crisis on the relationship between the two market liquidity variables and stock returns in Malaysia. Did the Asian crisis significantly alter the magnitude or the direction of the relationship between market liquidity and stock returns? In this paper, we run univariate regressions as well as multivariate regressions that include beta, size, book-to-market, and momentum as control variables.

Our results show that both turnover ratio and turnover-volatility ratio significantly explain stock returns in Malaysia during that period. When the market was more liquid, stock returns were

significantly larger. This study also shows that the Asian crisis did not significantly alter the impact of market liquidity on stock returns. In other words, there was no significant difference between pre- and post-crisis periods in terms of the impact of market liquidity on returns. These findings indicate that the impact of market liquidity on stock returns is robust. Even a big financial crisis like the Asian crisis did not change this relationship. It is important to note that in this study, we are not measuring the impact of the Asian crisis on liquidity. Instead, we measure the interactive impact of the Asian crisis on the relationship between liquidity and stock returns.

The paper proceeds as follows: Section 2 reviews the previous literature. Section 3 lays out the hypotheses. Section 4 explains the materials and methods. Section 5 shows the empirical results, and section 6 discusses the results.

2. Literature Review

Several papers including Amihud et al. (1990), Wong and Fung (2001), and Koulakiotis et al. (2016) contend that financial crises have a significant impact on market liquidity. Amihud et al. (1990) argue that, when the 1987 stock market crash started, investors realized how illiquid the markets were, therefore the crash became more severe. Wong and Fung (2001) examine the liquidity in the Hong Kong stock market during the Asian and Russian crises. They find that the liquidity levels for the five largest stocks worsened during both crises. Koulakiotis et al. (2016) examine volatility and return spillovers among small, medium, and large firm stock portfolios in Greece. They show that the transmission mechanism became less asymmetric after the global crisis. They also show existence of spillovers among small, medium, and large firm stocks as well as a feedback effect.

Other studies like Adrian et al. (2017) and Trebbi and Xiao (2017) find limited impact on liquidity. Adrian et al. (2017) examine dealer balance sheets after the 2007-2009 global crisis to see if the crisis had negatively affected market liquidity. They find only limited evidence of a negative impact on market liquidity. Trebbi and Xiao (2017) examine how new regulations affected market liquidity for corporate bonds after the global crisis. They show that regulatory intervention in the U.S. did not cause structural deteriorations in market liquidity. Adrian et al. (2018) also demonstrate that the implementation of new regulations following the global crisis appeared to make the financial system safer. According to them, these changes were effective, and they were not too costly. Barrot et al. (2016) look from a different perspective and show that, during the crisis, while active retail stock traders provided liquidity by increasing their holdings, mutual fund investors sold their mutual funds. They demonstrate that the market did not reward the retail stock traders who provided liquidity.

While these studies show the impact of financial crises on market liquidity, many other studies examine the impact of liquidity on stock returns. Fouse (1977) argues that both liquidity premium and risk premium explain expected stock returns. Amihud and Mendelson (1986) show that, when bid-ask spread is greater, the degree of the relationship between illiquidity and expected returns decreases. Brennan et al. (1998), Chordia et al. (2001), and Datar et al. (1998) examine the relationship between average returns and liquidity in the U.S. stock market. Using turnover ratio as a measure of liquidity, Datar et al. (1998) show that there is a negative relationship between liquidity and stock returns, even after controlling for firm size, book-to-market equity, beta, and the January effect. Brennan et al. (1998) show that size, book-to-market, momentum, and trading volume (i.e., liquidity) significantly explain cross-sectional returns. Chordia et al. (2001) look at stock returns while taking into account firm size, book-to-market equity ratio, momentum, dividend yields, price level, and non-linearity. They discover that both the level and variability of liquidity have a negative effect on stock returns. They show that the variability in liquidity has a more significant effect on stock returns than the average level of liquidity. Jun et al. (2003) demonstrate a positive relationship between stock returns in emerging markets and market liquidity, by utilizing aggregate (i.e., market) liquidity instead of individual liquidities.

More recently, Chiang and Zheng (2015) show that, for G7 countries, market illiquidity risk is positively correlated to excess stock returns. Marozva (2019) examines the relationship between excess returns and stock liquidity. The author uses the three-factor model and adds liquidity as a fourth factor. The author shows that liquidity is an important factor for excess stock returns (i.e., there is a positive and significant relationship between illiquidity and excess stock returns). Chung and Chuwonganant (2018) show that higher market volatility causes greater illiquidity premiums and greater risk premiums and that these factors create a negative relation between market volatility and stock returns. They find that, in the high-frequency trading era, stock returns are more sensitive to volatility shocks. They also find that due to increased competition between dealers and public traders after recent regulatory changes, tick size went down and market makers became less important, and these also caused returns to be more sensitive to volatility shocks.

Bhattacharya et al. (2019) discovered a relationship between various measures of liquidity, such as spread, trading volume, trading probability, turnover rate, market efficiency coefficient, and stock returns, in both the long- and short-term. Fontaine et al. (2015) find that funding shocks increase the illiquidity and volatility of stocks. They also find that funding shocks decrease returns. Kumar and Misra (2015) provide a review of the literature on the relationship between liquidity and asset prices. They also review the impact of liquidity on financing decisions and firm valuations. Roggi and Giannozzi (2015) examine how liquidity-related events affect stock prices. They demonstrate that during liquidity-constraining events, firms with more illiquid assets and liabilities experience a more negative impact on their stocks; whereas during liquidity-expanding events, these same firms' stocks experience a more positive impact. In contrast to the results for U.S. stocks, Leirvik et al. (2017) demonstrate that there is no significant relationship between returns and market liquidity in Norway.

Several other recent papers look at the issue from different perspectives. Chang et al. (2017) show that stock liquidity increases stock price crash risk. According to them, managers of liquid stocks do not announce adverse news because they fear that if they disclose the adverse news, transient investors will sell their investment. However, the accumulation of bad news forces these managers to announce it in the future, leading to a potential crash. Chung and Ariff (2016) link money supply, banking liquidity, and stock index returns for G4 (the U.S., Japan, Canada, and the U.K.) countries. They argue that money supply affects banking liquidity, and banking liquidity in turn affects stock returns. Vintilă and Nenu (2016) examine Romanian firms and show that liquidity and corporate financial performance have a negative relationship. Huang et al. (2015) show that a decrease in individual stock liquidity increases the credit risk premiums and the credit spread for U.S. corporate bonds. Boudt et al. (2017) show that market liquidity can stabilize or destabilize equity-collateralized funding liquidity. Bookstaber and Paddrik (2015) argue that any market liquidity model that does not control for the behavior of liquidity suppliers, liquidity demanders, and market makers is likely to fail.

Overall, given the significant relationship between financial crises and liquidity, and between liquidity and stock returns as shown in the previous studies, we contend that financial crises should affect stock returns through their impact on market liquidity. Koulakiotis et al. (2016) focus on how the recent global crisis creates volatility and return spillovers among small, medium, and large firm stock portfolios in Greece. In this study, we focus on a different financial crisis, namely the 1997 Asian Crisis, and examine its impact on stock returns in an important emerging stock market, i.e., the Malaysian stock exchange.

3. Hypotheses

In line with previous research findings in developed and emerging markets, we expect to see market liquidity having a positive impact on stock returns in Malaysia. Consequently, we formulate our first two hypotheses as follows:

H₁: Stock returns are higher when the turnover ratio is higher.

H₂: Stock returns are higher when the turnover-volatility ratio is higher.

With regards to the relationship between market liquidity and stock returns, we expect to find that market liquidity is even more important for the stock market after a crisis. This is due to the fact that markets are more distressed, and liquidity becomes more of a concern in the stock markets after a crisis starts. Therefore, we expect to see both the turnover ratio and the turnover-volatility ratio to have a significantly larger impact on stock returns post-crisis (i.e., we expect the liquidity-Asian crisis interaction term to have a positive and significant impact on returns). As such, we formulate our final two hypotheses as follows:

H₃: The turnover ratio has a significantly larger impact on stock returns post-crisis.

H₄: The turnover-volatility ratio has a significantly larger impact on stock returns post-crisis.

4. Data and Methodology

We use monthly stock price and dividend data for stocks listed on the Malaysian Stock Exchange, KLSE, from January 1994 to December 2003. We exclude utility firms, financial firms, and foreign companies. Out of the 945 Malaysian stocks during the period, the number of companies that had the required data ranged from over 200 in 1996 to 557 in 2003.

This study estimates and uses two liquidity measures, i.e., the natural log of the ratio of monthly trading volume to market capitalization at the end of the month (*TOVR*), and the turnover ratio divided by the standard deviation of stock market returns (interday volatility) calculated over the past 24 months (*TOVOL*). The individual stock returns are calculated as the natural log of stock returns (*RT*). Beta, size, book-to-market, and momentum are used as control variables in this study. The systematic risk of the stock is represented by β , the size of firms (*MSIZE*) is estimated as the natural log of its market capitalization at the end of the month, and the book-to-market (*B_MV*) is the ratio of its book value of equity at the end of fiscal year t to its market value at the end of months after March year $t+1$. For the momentum variables, they include the cumulative return over the preceding 2nd and 3rd months (*MTM2D*), the cumulative return over the preceding 4th to 6th months (*MTM4D*), and the cumulative return over the preceding 7th to 12th months (*MTM7D*). We specify frm_i as the firm dummy and $mt h_t$ as the time dummy from March 1996 to December 2003. The Asian Financial Crisis dummy (*a97*) is denoted with 1 for periods after July 1997 and 0 otherwise.

In order to see the impact of market liquidity on stock returns and also to see the interacting effect of the Asian Financial Crisis on the relationship between market liquidity and stock returns, we run several regressions. Our regressions test for the impact of market liquidity (*TOVR* or *TOVOL*) and the interaction between market liquidity and Asian Financial Crisis on stock returns while controlling for beta, size, book-to-market, momentum, and their interactions with the Asian Financial Crisis. The full model is as shown below:

$$RT_{i,t} = \alpha_0 + \gamma_1\beta_{i,t} + \gamma_2\beta_{i,t} * a97 + \gamma_3MSIZE_{i,t} + \gamma_4MSIZE_{i,t} * a97 + \gamma_5B_MV_{i,t} + \gamma_6B_MV_{i,t} * a97 + \gamma_7MTM2D_{i,t} + \gamma_8MTM2D_{i,t} * a97 + \gamma_9MTM4D_{i,t} + \gamma_{10}MTM4D_{i,t} * a97 + \gamma_{11}MTM7D_{i,t} + \gamma_{12}MTM7D_{i,t} * a97 + \gamma_{13}TOVR/TOVOL_{i,t} + \gamma_{14}TOVR/TOVOL_{i,t} * a97 + \alpha_1frm_1 + \dots + \alpha_{i-1}frm_{i-1} + \lambda_1mth_1 + \dots + \lambda_{i-1}mth_{i-1} + \varepsilon_{i,t}$$

(1)

Two types of information make up the panel data used in this study: the temporal (time series) dimension, which pertains to the periodic observations characterizing each firm over the sample period (monthly observations from 1994 – 2003), and the spatial (cross-sectional) dimension, which reflects differences between firms on KLSE. Therefore, we employ the panel data regression technique to investigate the relationship between liquidity and stock returns on KLSE. We refer to the models as fixed effects models if the effects are non-random, and as random effects models otherwise.

The generally accepted way of choosing between fixed and random effects is by running the Hausman's specification test. This test essentially tests for whether there is a correlation between v_i (e_i) and the regressors. The test for this correlation is a comparison of the covariance matrix of the regressors in the LSDV model with those in the random effects model. The null hypothesis is that there is no correlation.

If there is no such correlation (failure to reject the null hypothesis), then it is statistically justified to use a random effects model. In the absence of such correlation, the fixed effects model takes precedence. Therefore, we begin by testing the appropriateness of the random effect models via the Hausman's specification test. At the 1 percent significance level, we reject the null hypothesis of no correlation between the error components and the regressors in the model for all random cross-section effects, random time-series effects, and random cross-section and time-series combinations. Therefore, the random effects model lacks statistical justification.

Next, we examine the fixed effects model for both one-way (cross-sectional or time-series effects) and two-way (cross-sectional and time-series effects) specifications. We use the poolability test (F -test) to test the null hypothesis of poolability (i.e., $\beta_f = 0$, where β_f is the n -dimensional vector of fixed effects parameters). This F -test uses the ordinary pooled regression model as the baseline for comparison. Rejection of the F -test (poolability test) suggests that a fixed effects model is appropriate to estimate our model.

Based on the F -test, we reject the null hypothesis of poolability for all cross-section fixed effects, time-series fixed effects, and cross-section time-series effects models. These results indicate the statistical justification of the fixed effects models. Our findings using different fixed effects are qualitatively similar. Therefore, we only report the regression results from the fixed (two-way) cross-section and time-series effect, based on the minimum mean-squared (MSE) and maximum Buse R -squared measure.

5. Findings

Table 1 shows the performance of the Malaysian stock market during the 1995-2003 period. We find that the 1997 Asian Financial Crisis significantly affected the stock market index as well as the market capitalization of the firms traded in the exchange. The KLCI Index went up from 617 in 1995 to 777 in 1996. Then, in 1997, it dropped to almost half (i.e., 397). The following year, it recovered; it rose to 586, which was still lower than the 1996 value. In 1999, the index further improved to 812 points. However, following this improvement, the index dropped to 680 points in 2000, and remained virtually unchanged until 2003.

The market capitalization of the enterprises traded on the exchange increased from MYR349 billion in 1995 to MYR469 billion in 1996. Then, in 1997, it fell to nearly half (MYR259 billion). The following year, it recovered, rising to MYR375 billion, but it remained lower than its

pre-crisis level. In 1999, the market capitalization increased to MYR553 billion. However, it fell to MYR444 billion in 2000 and remained quite stable until 2003.

Table 1. KLSE Market Performance 1995-2003

	1995	1996	1997	1998	1999	2000	2001	2002	2003
KLCI (points)	617	777	397	586	812	680	696	646	794
Market capitalization (MYR billion)	349	469	259	375	553	444	465	482	640
Average daily volume (Million)	268	402	124	247	364	309	225	254	505
Average daily value (MYR million)	230	308	469	497	805	1,000	394	534	839
Number of listed firms	529	621	708	736	757	795	812	865	906

Source: *KLSE annual report 2003*, www.bursamalaysia.com.my, and *Datastream*

The table indicates a similar trend in the average daily volume. There was a significant decline from 1996 to 1997. In 1996, the trading volume was 402 million. It dropped to 124 million in 1997. Later, it recovered. The average daily value shows somewhat a different trend. The average daily value in Malaysian ringgit (billions) continuously increased until 2000 (MYR1,000 billions). In 2001, it dropped significantly to MYR394 billion. In addition, the table shows the number of listed firms on the exchange. The number of listed firms continuously increased from 1995 to 2003. In 1995, there were 529 firms listed. In 2003, there were 906 firms listed.

Table 2 shows the summary statistics for the variables that we use in our analyses. The table shows the mean, the median, the standard deviation, the skewness, the kurtosis, and the results of the Kolmogorov-Smirnov normality tests for each variable. The Kolmogorov-Smirnov normality tests show that all of the variables have non-normal distributions during the sample period. All of the results are significant at the 1% level.

Table 2. Summary Statistics

Variable	N	Mean	Median	Std. Dev.	Skewness	Kurtosis	Normality Test
<i>RT</i>	46,095	-0.0108	-0.0093	0.1874	-0.0387	13.6394	.1014***
β	43,111	1.4223	1.1416	16.6463	59.9113	59.9113	.5002***
<i>MSIZE</i>	53,162	5.2134	5.0249	1.3933	0.5868	0.3150	.0612***
<i>B_MV</i>	31,706	6.7143	6.8296	0.9176	-0.8768	3.0067	.0611***
<i>MTM2D</i>	52,949	-0.0148	-0.0153	0.2650	-0.2616	7.6535	.0757***
<i>MTM4D</i>	51,710	-0.0270	-0.0257	0.3323	-0.2368	5.8701	.0746***
<i>MTM7D</i>	48,566	-0.0674	-0.0306	0.4604	-0.6961	3.5063	.0780***
<i>TOVR</i>	52,637	1.8392	1.8091	1.7976	-0.1332	0.4624	.0119***
<i>TOVOL</i>	46,602	11.1408	10.7417	14.3325	0.1223	10.3212	.0745***

Note: The sample period is from January 1994 to December 2003. The normality test results reported are for the Kolmogorov-Smirnov test. ***, **, and * denote significance at 1 percent, 5 percent, and 10 percent respectively.

Table 3 shows the Pearson's correlation coefficients for our variables. As the table shows, except for our two liquidity variables, *TOVR* and *TOVOL*, none of the pairwise correlations is high. We have also examined the variance inflation factors and find that they are low.

Table 3. The Pearson Correlation Coefficients

	<i>R</i>	<i>TOVR</i>	<i>TOVOL</i>	<i>MTM2D</i>	<i>MTM4D</i>	<i>MTM7D</i>	<i>MSIZE</i>	<i>B-MV</i>
<i>RT</i>	1.000							
<i>TOVR</i>	0.092	1.000						
<i>TOVOL</i>	0.089	0.822	1.000					
<i>MTM2D</i>	-0.018	0.045	0.049	1.000				
<i>MTM4D</i>	0.002	-0.063	-0.015	-0.030	1.000			
<i>MTM7D</i>	-0.002	-0.100	-0.051	0.110	0.010	1.000		
<i>MSIZE</i>	0.069	-0.195	-0.098	0.118	0.135	0.247	1.000	
<i>B MV</i>	-0.059	0.131	0.112	-0.132	-0.161	-0.297	-0.357	1.000

Table 4 presents the panel regression results using individual security data when the shock is the Asian financial crisis ($N = 557$, $T = 93$). The dependent variable is the monthly excess returns of individual stocks. While we look into the effects of each independent variable, here we focus on the turnover ratio (i.e., *TOVR*). We report the results from the two-way fixed effect model, based on the Mean Squared Error (*MSE*) and Buse (1973) R-squared for generalized least-squared regression (*GLS*) criteria. The two-way fixed-effects model is a specification that depends on the fixed effects of both the cross section and the time period to which the observation belongs. In this model, *a97* is the dummy variable for the Asian financial crisis, where 0 refers to the periods before July 1997 and 1 otherwise. $\beta*a97$, $MSIZE*a97$, B_MV*a97 , $MTM2D*a97$, $MTM4D*a97$, $MTM7D*a97$, and $TOVR*a97$ are the interaction terms between the Asian financial crisis dummy and the independent variables.

The first column shows the results of the univariate regression, where stock returns are explained by the turnover ratio and the interaction of the turnover ratio and the Asian Financial crisis. The turnover ratio itself has a positive and significant impact on stock returns (coef. = 0.0120, $p < 0.01$). However, the coefficient for the interaction term is statistically insignificant (coef. = -0.0021, $p > 0.10$). Therefore, the first column shows that while the turnover ratio did significantly explain stock returns, it did not significantly affect the impact of the turnover ratio on stock returns.

Table 4. Multivariate Regressions – Turnover Ratio and Returns during the Asian Crisis

	[1]	[2]	[3]
<i>Intercept</i>	-0.0166	-0.0108	-0.1592***
β		-0.0053	-0.0276
$\beta*a97$		0.0004	0.0473**
<i>MSIZE</i>			0.0797***
<i>MSIZE*a97</i>			-0.0146***
<i>B-MV</i>			-0.0347***
<i>B-MV*a97</i>			0.0052
<i>MTM2D</i>			-0.0805***
<i>MTM2D*a97</i>			-0.0129
<i>MTM4D</i>			-0.0331**
<i>MTM4D*a97</i>			-0.0408**
<i>MTM7D</i>			-0.0223**
<i>MTM7D*a97</i>			-0.0438***
<i>TOVR</i>	0.0120***	0.0122***	0.0128***
<i>TOVR*a97</i>	-0.0021	-0.0023	0.0002
<i>MSE</i>	0.0141	0.0142	0.0132

<i>R_square</i>	0.5235	0.5224	0.5547
<i>F-test for no fixed effects</i>	51.50***	50.00***	55.73***
<i>White's test</i>	1,183.79***	1,296.44***	2,050.11***

Note: ***, **, and * denote significance at 1 percent, 5 percent, and 10 percent respectively, based on White (1980) heteroskedasticity-corrected t-statistics.

The second column shows the results of the regression where stock returns are explained by β , the interaction of β and the Asian financial crisis, the turnover ratio, and the interaction of the turnover ratio and the Asian financial crisis. In this model, the turnover ratio again has a positive and significant impact on stock returns (coef.= 0.0122, $p < 0.01$). However, the coefficient for the interaction term is statistically insignificant (coef.= -0.0023, $p > 0.10$). Therefore, these findings align with the findings presented in the first column. The Asian financial crisis did not significantly affect the impact of the turnover ratio on stock returns. Here, the regression coefficient of β is negative but statistically insignificant (coef.= -0.0053, $p > 0.10$). The regression coefficient for $\beta*a97$ is also statistically insignificant (coef.= 0.0004, $p > 0.10$).

The third column displays the full model regression results, elucidating how β , *MSIZE*, *B-MV*, *MTM2D*, *MTM4D*, *MTM7D*, *TOVR*, and their interactions with the Asian financial crisis explain stock returns. The results of this full model confirm the results from columns 1 and 2: that the turnover ratio again has a positive and significant impact on stock returns (coef. = 0.0128, $p < 0.01$). However, the coefficient for the interaction term is statistically insignificant (coef. = 0.0002, $p > 0.10$). Therefore, we conclude that the Asian financial crisis did not significantly affect the impact of the turnover ratio on stock returns.

In this full model, the coefficient of β is statistically insignificant (coef. = -0.0276, $p > 0.10$), but the coefficient of $\beta*a97$ is positive and significant at the 5% level (coef. = 0.0473, $p < 0.05$). This finding indicates that β has a significantly more positive impact on stock returns after the Asian financial crisis when compared to the period before the crisis.

The coefficient of *MSIZE* is positive and significant (coef. = 0.0797, $p < 0.01$) while the coefficient of *MSIZE*a97* is negative and significant (coef. = -0.0146, $p < 0.01$). This finding indicates that while *MSIZE* itself has a positive and significant impact on stock returns, this impact became significantly smaller after the Asian financial crisis when compared to the period before the crisis.

The coefficient of *B_MV* is negative and significant (coef. = -0.0347, $p < 0.01$), while the coefficient of *B-MV*a97* is insignificant (coef. = 0.0052, $p > 0.10$). This finding indicates that while *B_MV* itself has a negative and significant impact on stock returns, it did not change significantly after the Asian financial crisis.

The coefficients of all the momentum variables (*MTM2D*, *MTM4D*, and *MTM7D*) are negative and significant (coef_{*MTM2D*}= -0.0805, $p < 0.01$; coef_{*MTM4D*}= -0.0331, $p < 0.05$; coef_{*MTM7D*}= -0.0223, $p < 0.05$). However, while the coefficient of *MTM2D*a97* is insignificant (coef. = -0.0129, $p > 0.10$), the coefficients of *MTM4D*a97* and *MTM7D*a97* are both negative and significant (coef_{*MTM4D*}= -0.0408, $p < 0.05$; coef_{*MTM7D*}= -0.0438, $p < 0.01$). These findings indicate that while *MTM2D* itself has a negative and significant impact on stock returns, its impact on stock returns did not change significantly after the Asian financial crisis. On the other hand, the above findings indicate that the impact of *MTM4D* and *MTM7D* on stock returns appeared to be significantly smaller after the Asian financial crisis.

Table 5 shows the panel regression results where we focus on the impact of the T (i.e., *TOVOL*) on the monthly excess returns of individual stocks. Similar to Table 4, here, *a97* is the dummy variable for Asian financial crisis, where 0 refers to the periods before July 1997 and 1 otherwise. $\beta*a97$, *MSIZE*a97*, *B_MV*a97*, *MTM2D*a97*, *MTM4D*a97*, *MTM7D*a97*, and

*TOVOL*a97* are the interaction terms between the Asian financial crisis dummy and the independent variables.

Table 5. Multivariate Regressions – *TOVOL* Ratio and Returns during the Asian Crisis

	[1]	[2]	[3]
<i>Intercept</i>	-0.0134	-0.0202	-0.1529***
β		-0.0019	-0.0294
$\beta*a97$		0.0075	0.0630***
<i>MSIZE</i>			0.0758***
<i>MSIZE*a97</i>			-0.0128***
<i>B-MV</i>			-0.0370***
<i>B-MV*a97</i>			0.0062
<i>MTM2D</i>			-0.0738***
<i>MTM2D*a97</i>			-0.0189
<i>MTM4D</i>			-0.0295*
<i>MTM4D*a97</i>			-0.0445***
<i>MTM7D</i>			-0.0235**
<i>MTM7D*a97</i>			-0.0441***
<i>TOVOL</i>	0.0011***	0.0011***	0.0011***
<i>TOVOL*a97</i>	-0.0002	-0.0002	0.0001
<i>MSE</i>	0.0142	0.0142	0.0133
<i>R_square</i>	0.5216	0.5217	0.5537
<i>F-test for no fixed effects</i>	49.05***	48.85***	54.36***
<i>White's test</i>	917.82***	1,103.60***	1,741.70***

Note: ***, **, and * denote significance at 1 percent, 5 percent, and 10 percent respectively, based on White (1980) heteroskedasticity-corrected *t*-statistics.

The first column shows the results of the univariate regression, where stock returns are explained by the turnover-volatility ratio and the interaction of the turnover-volatility ratio and the Asian financial crisis. The turnover-volatility ratio itself has a positive and significant impact on stock returns (coef. = 0.0011, $p < 0.01$). However, the coefficient for the interaction term is statistically insignificant (coef. = -0.0002, $p > 0.10$). Therefore, the first column shows that the Asian financial crisis did not significantly affect the impact of the turnover-volatility ratio on stock returns.

The second column shows the results of the regression where stock returns are explained by β , the interaction of β and the Asian financial crisis, the turnover-volatility ratio, and the interaction of the turnover-volatility ratio and the Asian financial crisis. In this model, the turnover-volatility ratio again has a positive and significant impact on stock returns (coef. = 0.0011, $p < 0.01$). However, again, the coefficient for the interaction term is statistically insignificant (coef. = -0.0002, $p > 0.10$). Therefore, the findings here support the finding in the first column: that the Asian financial crisis did not significantly affect the impact of the turnover-volatility ratio on stock returns. Here, the regression coefficient of β is negative but statistically insignificant (coef. = -0.0019, $p > 0.10$). The regression coefficient for $\beta*a97$ is also statistically insignificant (coef. = 0.0075, $p > 0.10$).

The third column shows the results of the full model regression, where stock returns are explained by β , *SIZE*, *B_MV*, *MTM2D*, *MTM4D*, *MTM7D*, *TOVOL*, and each of these variables' interaction with the Asian financial crisis. The results with this full model confirm the results from

columns 1 and 2: the turnover-volatility ratio again has a positive and significant impact on stock returns (coef. = 0.0011, $p < 0.01$). However, the coefficient for the interaction term is statistically insignificant (coef. = 0.0001, $p > 0.10$). Therefore, we conclude that the Asian financial crisis did not significantly affect the impact of the turnover-volatility ratio on stock returns.

In this full model, the coefficient of β is statistically insignificant (coef. = -0.0294, $p > 0.10$), but the coefficient of $\beta \cdot a97$ is positive and significant at the 1% level (coef. = 0.0630, $p < 0.01$). This finding indicates that β has a more positive impact on stock returns after the Asian financial crisis when compared to the period before the crisis.

The coefficient of $MSIZE$ is positive and significant (coef. = 0.0758, $p < 0.01$), while the coefficient of $MSIZE \cdot a97$ is negative and significant (coef. = -0.0128, $p < 0.01$). This finding indicates that while $MSIZE$ itself has a positive and significant impact on stock returns, this impact became significantly smaller after the Asian financial crisis when compared to the period before the crisis.

The coefficient of B_MV is negative and significant (coef. = -0.0370, $p < 0.01$), while the coefficient of $B_MV \cdot a97$ is insignificant (coef. = 0.0062, $p > 0.10$). This finding indicates that while B_MV itself has a negative and significant impact on stock returns, it did not change significantly after the Asian financial crisis.

All the coefficients related to momentum ($MTM2D$, $MTM4D$, and $MTM7D$) are negative and significant (coef. = -0.0738, $p < 0.01$; coef. = -0.0295, $p < 0.10$; coef. = -0.0235, $p < 0.05$, respectively). The coefficient of $MTM2D \cdot a97$ turns out to be insignificant (coef. = -0.0189, $p > 0.10$), which indicates that while $MTM2D$ itself has a negative and significant impact on stock returns, its impact on stock returns did not change significantly after the Asian financial crisis. However, both the coefficients of $MTM4D \cdot a97$ and $MTM7D \cdot a97$ are negative and significant (coef. = -0.0445, $p < 0.01$; coef. = -0.0441, $p < 0.0$, respectively). These findings indicate that $MTM4D$ and $MTM7D$ have a negative and significant impact on stock returns and that their impact on stock returns got significantly smaller after the Asian financial crisis.

6. Discussion and Conclusion

This study examines the impact of market liquidity on stock returns in Malaysia during the 1997 Asian Financial Crisis. While examining the impact of liquidity on stock returns, we also consider the interacting effect of the Asian crisis on this relationship. We attempt to show whether a major financial crisis like the Asian financial crisis alters the relationship between market liquidity and stock returns, and if so, how does this relationship change? Does this relationship become stronger or weaker after the crisis? Or does the crisis alter this relationship so much that it becomes negative? We anticipate that the crisis will strengthen this relationship, as liquidity becomes a more critical factor after the crisis.

We use two measures of liquidity: The turnover ratio and the turnover-volatility ratio. While the turnover ratio measures the depth of liquidity, the turnover-volatility ratio measures the volatility component. For the control variables, we use beta, size, book-to-market equity ratio, as well as momentum variables.

Our findings show that beta by itself is insignificant in explaining returns in Malaysia during that period. However, we find that, post-crisis, it has a larger impact on returns. Size has a positive and significant impact on returns, but post-crisis, its impact significantly declined. Book-to-market equity has a negative and significant impact on returns. We find that its impact on stock returns did not change significantly after the Asian Financial Crisis. Our results show that the three momentum variables each had a negative and significant impact on returns. Post-crisis, the impact of momentum on returns becomes even more negative (i.e., for two of the three momentum variables).

When we examine how liquidity affected stock returns in Malaysia during this period, we find that both turnover ratio and turnover-volatility ratio had a positive and significant impact on

returns. This result is for the overall period (pre- and post-crisis periods combined). When the market was more liquid, stock returns were significantly larger. When we use the bid-ask spread instead of the turnover ratio or the turnover-volatility ratio as our liquidity measure, the results do not change. Market liquidity has a positive and significant impact (i.e., the bid-ask spread has a negative and significant impact) on stock returns in Malaysia.

On the other hand, when we examine whether the Asian Financial Crisis significantly altered the impact of market liquidity on stock returns, we find that there was no significant difference between pre- and post-crisis periods in terms of the impact of market liquidity on returns. For both liquidity measures, there was no significant difference between the pre- and post-crisis periods. The impact of the turnover ratio on stock returns was slightly larger after the crisis, but this increase was not statistically significant. Similarly, our results show that the impact of the turnover-volatility ratio on stock returns was slightly larger after the crisis, but this increase again was not statistically significant.

These findings indicate that the impact of market liquidity on stock returns is robust. Even a major financial crisis like the Asian crisis did not change this relationship. It is important to note that, while the Asian crisis did not reduce the impact of market liquidity on returns, it did not significantly increase the impact either. In other words, while liquidity is shown to be a bigger concern in times of financial or economic crisis in studies like Amihud et al. (1990) and Wong and Fung (2001), our results show that this did not significantly alter the magnitude (or sign) of the relationship between liquidity and returns.

Policymakers should note that market liquidity is crucial for stock returns in a developing country like Malaysia. The significance of this relationship does not change whether the country is dealing with a financial or economic crisis or not. We recommend that future papers focus on more recent crises, e.g., the 2008-2009 Global Economic Crisis, to see how it affected liquidity-return dynamics. We also recommend that researchers compare developed and developing markets in terms of their liquidity-return dynamics pre- and post-crisis. How would the results change if we used the depth, efficiency, and stability measures of a financial market as control variables? What factors are important for liquidity-return dynamics? Several avenues of research are open to researchers in this area.

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